IN THE CLAIMS

1. (Original): A method of determining the nitrogen content of a nitrided gate oxide layer on a semiconductor substrate comprising:

oxidizing the nitrided gate oxide layer on the substrate;

measuring the thickness of the oxidized nitrided gate oxide layer;

optionally calculating the change in thickness of the oxidized nitrided gate oxide layer; and

determining if the measured thickness or calculated change in thickness of the oxidized nitrided gate oxide layer exceeds a predetermined value.

2. (Original): The method of claim 1, wherein the oxidizing step comprises rapid thermal oxidation of the nitrided gate oxide layer in a rapid thermal processing (RTP) chamber.

3. (Original): The method of claim 1, further comprising correlating the measured thickness or change in thickness of the oxidized nitrided gate oxide layer with the nitrogen content of the gate oxide layer.

4. (Original): The method of claim 1, further comprising nitriding a gate oxide layer prior to the oxidizing step.

5. (Original): The method of claim 4, further comprising forming an initial oxide layer on the substrate prior to the nitriding step.

6. (Original): The method of claim 3, wherein the correlating step comprises:

measuring the oxidized nitrided gate oxide thickness for a plurality of samples each having a known nitrogen content;

optionally calculating the change in thickness after oxidizing the nitrided gate oxide layer for each sample; and

performing a least squares regression analysis to generate a calibration curve for nitrogen

content of the nitrided gate oxide as a function of oxidized nitrided gate oxide thickness or change in oxidized nitrided gate oxide thickness.

7. (Original): The method of claim 1, wherein the step of determining the change in thickness of the oxidized nitrided gate oxide layer comprises determining the initial gate oxide thickness by measuring the thickness of the gate oxide layer prior to the oxidation step and calculating the difference between the measured oxidized nitrided gate oxide layer thickness and the initial gate oxide thickness.

8. (Original): The method of claim 7, wherein the initial gate oxide thickness is measured before the nitridation step.

9. (Original): The method of claim 7, wherein the initial gate oxide thickness is measured after the nitridation step.

10. (Currently Amended): ~~The~~ A method of determining the nitrogen content of a nitrided gate oxide layer on a semiconductor substrate comprising:

oxidizing the nitrided gate oxide layer on the substrate;

measuring the thickness of the oxidized nitrided gate oxide layer;

calculating the change in thickness of the oxidized nitrided gate oxide layer; and

determining if the measured thickness or calculated change in thickness of the oxidized nitrided gate oxide layer exceeds a predetermined value ~~claim 1,~~ wherein ~~the step of determining~~ calculating the change in thickness of the oxidized nitrided gate oxide layer comprises determining the initial gate oxide thickness by estimating the thickness of the gate oxide layer prior to the oxidation step and calculating the difference between the measured oxidized nitrided gate oxide layer thickness and the initial gate oxide thickness.

11. (Original): The method of claim 10, wherein the initial gate oxide thickness is estimated from previously collected gate oxide thickness data.

12. (Original): The method of claim 1, further comprising a step of forming a gate electrode layer over the gate oxide layer.

13. (Original): The method of claim 12, further comprising a step of implanting boron atoms in the gate electrode layer.

14. (Original): The method of claim 12, wherein the predetermined value corresponds to a nitrogen content sufficient to prevent boron atoms from diffusing through the gate oxide layer and into the semiconductor substrate.

15. (Original): The method of claim 1, wherein the oxidation step is conducted at a temperature of 900 to 1025 °C.

16. (Original): The method of claim 15, wherein the oxidation step is conducted for 10 minutes or less.

17. (Original): The method of claim 4, wherein the oxidizing step is performed in the same tool as the nitridation step.

18. (Original): The method of claim 4, wherein the nitridation step is performed in a first tool and the substrate is transferred to a different tool for the oxidizing step.

19. (Original): A method for monitoring the nitrogen content of a nitrided gate oxide layer on a semiconductor substrate wherein the nitrided gate oxide layer is oxidized, the method comprising:

a) measuring the thickness of the oxidized nitrided gate oxide layer with a film thickness measuring device for each substrate in a batch of semiconductor substrates;

b) collecting data on the thickness of the oxidized nitrided gate oxide layer for each substrate in the batch on a computer in communication with the film thickness measuring device;

c) storing the oxidized nitrided gate oxide thickness data for the batch in a data base;

d) computing a batch average value for the thickness of the oxidized nitrided gate layer;

e) storing the batch average value on the computer;

f) repeating steps (a) through (e) above for additional batches of semiconductor substrates;

g) determining process control limits from the stored batch average values ; and

h) monitoring the nitrogen content by oxidizing a semiconductor substrate having a nitrided gate oxide layer, measuring the oxidized nitrided gate oxide layer thickness and comparing the measured value to the process control limits.

20. (Withdrawn): A monitoring system for statistical process control of the nitrogen content of a nitrided gate oxide layer on a semiconductor substrate, the system comprising:

a furnace for oxidizing a nitrided gate oxide layer on said semiconductor substrate;

a film thickness measuring device adapted to measure the thickness of the oxidized nitrided gate oxide layer; and

a computer in communication with the film thickness measuring device;

wherein the computer is adapted to: monitor the thickness of the oxidized nitrided gate oxide layer after an oxidation step conducted in the furnace; store the measured thickness values collected from the thickness measuring device in memory; and retrieve and analyze the measured thickness values.

21. (Withdrawn): The system of claim 20, wherein the computer is adapted to calculate process control limits from the measured film thickness data.

22. (Withdrawn): The system of claim 21, further comprising an alarm adapted to indicate when the measured film thickness exceeds the process control limits.